TerranearPMC Safety Share

Week of September 21, 2015 – Aircraft Fires

It happened a few weeks ago in, of all places – Vegas! A British Airways Boeing 777 engine caught fire during takeoff at McCarran Airport, sending 20 passengers to the hospital for smoke inhalation. Within 24 hours, the National Transportation Safety Board (NTSB) began the process of conducting an investigation, trying to understand the cause of this incident.

While the public's greatest concern of aircraft accidents are crashes, fires occur much more frequently and, according to independent investigation reports, happen more often than the airline industry would care to admit. On the average, three flights a day are diverted for in-flight smoke problems somewhere in the world. A sobering statistic is that you, as an individual, have a chance of being in an aircraft fire at about one in 10,000!

Fire in the air is one of the most hazardous situations that a flight crew can be faced with. Without aggressive intervention by the flight crew, a fire on board an aircraft can lead to the catastrophic loss of that aircraft within a very short time frame. Once a fire has developed beyond its incipient stage, it is unlikely that the crew will be able to extinguish it.

While safety organizations have begun to revise methods of fighting aircraft fires, the fact is that the aviation industry has not kept up with a growing fire risk. Among the greatest mistakes made by crews in fighting fires is the common practice of opening cockpit doors and windows to clear smoke in an effort to improve their visibility. Rather than clearing smoke, opening the cockpit usually makes the fire and smoke worse, and experts strongly recommend that pilots and flight attendants receive new training.

"Once the flight deck door is opened, it is no longer a barrier," said the report, written by John Cox, former head of safety for the U.S. pilots union and now head of his own consulting firm, Safety Operating Systems.

The most frequent source of fire in transport aircraft is electrical with the most prevalent factors being due to poor housekeeping in hard-to-reach areas. Such hazardous conditions are not unique to older aircraft as newer aircraft have been identified with the same problem. In addition to housekeeping, other concerns include inadequate and worn insulation, bundling of wires that can cause electrical arcing, as well as an accumulation of dust and flammable debris. And there is a LOT of electrical wires aboard an aircraft; Modern aircraft have more than 500,000 feet, or 150,000 meters, of wire.

Back in 1996, when the disaster of the TWA Flight 800 (off the coast of Long Island in New York) occurred, the ensuing investigation revealed a number of problems with the aircraft's wiring. This lead to an inspection of electrical wiring aboard 25 other aircraft and showed that only one aircraft, a new Boeing 737, had clean wiring areas. According to the investigation report, "…many of the airplanes had foreign material - lint, metal shavings, washers, screws, rivets, corrosion prevention compound, paint and pieces of paper - between wires or wiring bundles…wire insulation was

damaged or cut by the metal debris. There were cases of the core conductor being exposed. Five of the aircraft showed signs of fire or heat damage in wiring."

Yet wiring is often hidden and inaccessible behind aircraft walls. Two-thirds of the 397 wiring failures reported between 1995 and 2002 were in areas where detection of the problems was not possible in advance of the failure while much of the wiring is failing prematurely. Because such fires cannot be readily detected, there is a reduced response time and, thereby, increasing the risk for increased damage.

In addition to the risk of fire, smoke and heat represent severe risks. Smoke can reduce visibility within the aircraft. An electrical fire in an aircraft typically generates a lot of thick white smoke which can render the flight crew blind, unable to see the instruments or see out of the windows. Smoke and fumes from an in-flight fire are likely to be highly toxic and irritating to the eyes and respiratory system. Smoke and fumes may therefore quickly incapacitate the crew unless they take protective action. Meanwhile heat from fires will affect aircraft systems and ultimately affect the structural integrity of the aircraft.

According to a new report now circulating in the aviation community, pilots and flight attendants often make basic mistakes in fighting smoke and fire aboard passenger aircraft, "Unfortunately, opened to be retrained on proper procedures when a fire does occur. The report stresses that the cockpit door and cockpit window need to be closed. Pilots need better full-face oxygen masks and a greater supply of oxygen while larger fire extinguishers should be placed on board. These changes can make it easier for crews to get to wiring to fight fires. In addition, the report stresses better housekeeping in wire bays, better wiring inspection processes, new electrical protection technology, an increased number of fire sensors throughout the plane and use of infrared detectors to locate hot spots behind walls.

Unfortunately, the risk of aircraft fires will always remain a concern as it is not possible to eliminate all the ignition sources or fuel in remote locations within an aircraft. But effective controls can be implemented. According to aircraft safety experts, the most important consideration to mitigate an in-flight fire is time. From the first indication that there is a fire on board an aircraft, the crew has on average approximately 17 minutes to get the aircraft on the ground.

While an engine fire is normally detected and contained satisfactorily by the aircraft fire detection and suppression systems, in certain circumstances (e.g. an explosive breakup of the turbine), the nature of the fire is such that onboard systems may not be able to contain the fire and it may spread to the wing and/or fuselage. Ever where an engine fire has been successfully contained, there is still a risk that the fire may reignite and therefore it is still advisable for the crew to land the aircraft as soon as possible and allow fire crews to carry out a visual examination of the engine.

Never interrupt someone doing what you said couldn't be done.
Amelia Earhart